

The comparative example 7 provides an AlN sintered body with a small amount of Y2O3 added and a low volume resistivity. The volume resistivity at room temperature was as low as $8 \times 10^{10} \Omega \cdot \text{cm}$, and the resistivity at 300 °C was not higher than $1 \times 10^7 \Omega \cdot \text{cm}$. The temperature dependency of volume resistivity was, therefore, large. The activation energy of the temperature dependency was as large as 0.71 eV (25 to 170 °C).

The comparative example 8 provides an AlN sintered body with a small amount of CeO2 added and a low volume resistivity. Although the volume resistivity at room temperature was reduced as the comparative example 7, the resistivity at 300 °C was not higher than $1 \times 10^7 \Omega \cdot \text{cm}$. The temperature dependency of volume resistivity was large. The activation energy of the temperature dependency was as large as 0.69 eV (25 to 170 °C).

(4) Examples 11 to 14 (tables 4 and 5)

Sintered bodies were produced according to substantially the same procedure as the example 1 (Tables 1 and 2), except that Al2O3 powder and SmAlO3 powder were added simultaneously. The properties of each sintered body were then evaluated. Commercial Al2O3 powder having a purity of not lower than 99.9 percent and a mean particle diameter of 1 to 2 μm was used.

Table 4

raw powder				sintering condition		properties of sintered body					
AlN powder				sintering temperature		chemical analysis data					
	type	oxygen content weight%	Sm2O3 mol%	Al2O3 mol%	°C	O content weight%	Sm content weight%	C content weight%	Sm2O3 converted content	Al2O3 calculated content	Sm2O3/Al2O3 molar ratio
example 11	A	0.97	0.58	1.11	1800	2.67	2.94	0.03	0.426	1.993	0.214
example 12	B	0.87	0.35	0.43	1800	1.63	1.83	0.028	0.259	1.180	0.219
example 13	B	0.87	0.58	1.20	1800	2.68	2.94	0.033	0.426	1.999	0.213
example 14	B	0.87	1.13	3.04	1800	4.95	5.40	0.034	0.825	3.911	0.211

Table 5

properties of sintered body									
	open porosity	bulk density	resistivity 25°C	resistivity 300 °C	activation energy	bending strength	thermal conductivity	average grain diameter of AlN	crystalline phase (excluding AlN)
example 11	% 0.05	g/cm ³ 3.38	$\Omega \cdot \text{cm}$ 1E+10	$\Omega \cdot \text{cm}$ 1E+07	e V 0.36	MPa 356	W/mK 92	μm 4	SmAlO ₃ , SmAl ₁₁ O ₁₈
example 12	0.02	3.33	4E+10	6E+07	0.35	390	100	4	SmAlO ₃ , SmAl ₁₁ O ₁₈
example 13	0.04	3.37	6E+09	1E+07	0.34	347	95	4	SmAlO ₃ , SmAl ₁₁ O ₁₈
example 14	0.13	3.44	2E+09	4E+06	0.33	308	83	4	SmAlO ₃ , SmAl ₁₁ O ₁₈